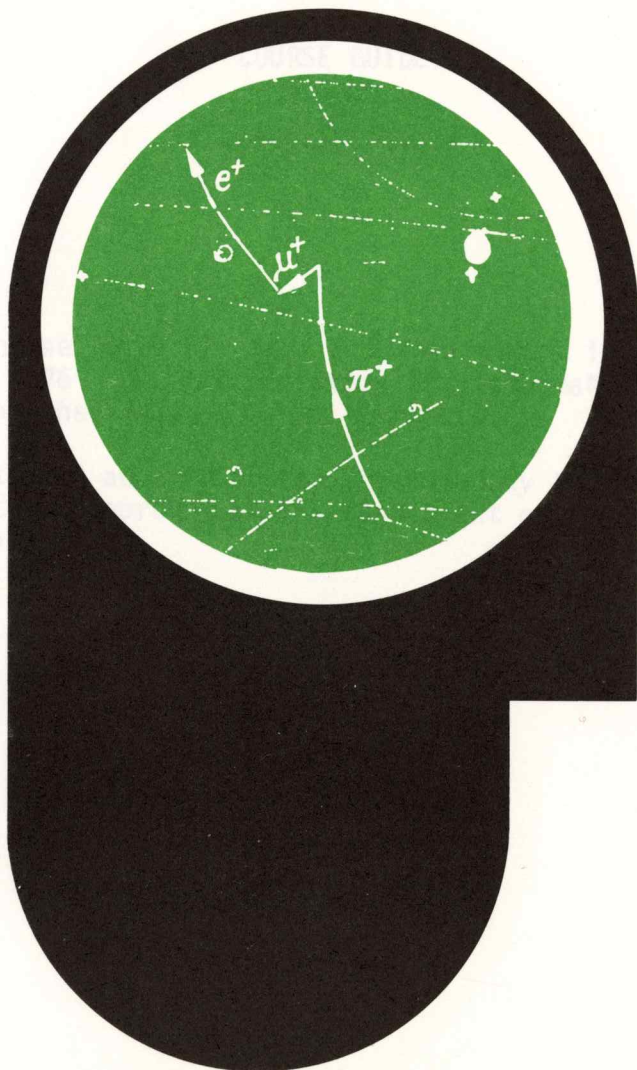


Science



Sir George Williams
Faculty of Science

Physics





FULL-TIME FACULTY

Associate Professor the Department

Stanley P. Morris, Ph.D. (McGill)

SIR GEORGE WILLIAMS CAMPUS

Adjunct Professor

DEPARTMENT OF PHYSICS

Walter R. Raudorf, Ph.D. (McGill)

Associate Professor

COURSE GUIDE

David E. Charlton, Ph.D. (Saskatchewan)

Nelson Eddy, Ph.D. (Albany)

Barry Frank, Ph.D. (U.S.A.)

Arline L. Zipling, Ph.D. (Exeter)

John A. Mackinnon, Ph.D. (McGill)

Sushil K. Misra, Ph.D. (St. Louis)

Jean-Pierre Petalas, B.Sc. (Sir George)

1976 - 77

This course guide has been prepared months in advance of the 1976 - 77 academic year, and information contained herein is subject to change.

Students are advised not to purchase any texts without the approval of the department or professor concerned.

Adjunct Assistant Professor

Sylvio Zenone

Director of Laboratories

Wayne L. Spears



SIR GEORGE WILLIAMS CAMPUS

DEPARTMENT OF PHYSICS

COURSE GUIDE

1976 - 77

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Sushil K. Misra, Ph.D. (St. Louis)

Jean-Pierre Petolas, B.Sc. (Sir George)

Ramesh C. Sharma, Ph.D. (Toronto)

Adolph E. Smith, Ph.D. (Michigan)

Adjunct Associate Professor

Photios A. Anninos, Ph.D. (Syracuse)

Adjunct Assistant Professor

Sylvio Zenone

Director of Laboratories

Wayne L. Spears

COURSES

The student will benefit greatly by the presentation of the physics courses in the following ways:

1. The lecture part (theory) of a course may be taken before the laboratory part (experimental), which is desirable because every physics experiment, in addition to teaching experimental techniques, either verifies the theory or uses the results of theory.
2. The lecture part only of a course may be taken. This will accommodate the mathematically (theoretically) inclined students who would not otherwise take the same physics lecture course if they also had to take the laboratory part of the course.
3. The laboratory part of a course may be taken without the lecture part. This applies to Experimental Electronics, the new innovative physics electronics labs for which the electronics lecture course is not a prerequisite. The physics electronics lab courses teach students to be skilled users of modern electronic instrumentation, the basic tool of the experimental physicist.

For further information on undergraduate programmes, call the Chairman, Dr. S.P. Morris, 879-4041 or Dr. S.K. Misra, 879-4065, the Undergraduate Program Director of Physics.

PHYSICS LABORATORIES

The physics laboratories are unique in two important respects:

1. The student may do the experiments in the day or evening simply by making a reservation for an available time slot.
2. The laboratory is under computer control to the extent that marking of tests written in the laboratory test room and record keeping are done on-line by the University computer.

WORKING STUDENTS

THE PHYSICS COURSES ARE OFFERED IN SUCH A WAY THAT THEY CAN BE COMPLETED IN THE EVENINGS DURING THE PERIOD OF TIME SPENT BY A WORKING STUDENT TOWARDS A DEGREE.

PROGRAMMES

Three physics programmes in undergraduate studies are offered at Sir George Williams Campus;

Specialization in Experimental Physics (Total 60 credits)
(formerly known as major in experimental physics)

Ph. N-241 (6 Cr.), Ph. N-251 (6 Cr.), Ph. N-291 (2 Cr.),
Ph. N-292 (2 Cr.), Math N-261 (6 Cr.), Ph. N-295 (4 Cr.),
Ph. N-336 (6 Cr.), Ph. N-352* (3 Cr.), Ph. N-355 (5 Cr.),
Ph. N-364* (3 Cr.), Ph. N-392* (1 Cr.), Ph. N-394* (1 Cr.),
Ph. N-433 (3 Cr.), Ph. N-465* (3 Cr.), or Ph. N-467* (3 Cr.),
Ph. N-477* (3 Cr.), Ph. N-493* (1 Cr.), Ph. N-495* (1 Cr.),
Ph. N-496 (4 Cr.)

Specialization in Theoretical Physics (Total 60 Credits)
(formerly known as major in theoretical physics)

Ph. N-241 (6 Cr.), Ph. N-251 (6 Cr.), Ph. N-291 (2 Cr.),
or Ph. N-292 (2 Cr.), Math. N-261 (6 Cr.), Ph. N-336 (6 Cr.),
Ph. N-345 (6 Cr.), Ph. N-352* (3 Cr.), Ph. N-364* (3 Cr.),
Ph. N-394* (1 Cr.), Ph. N-433 (3 Cr.), Ph. N-457 (6 Cr.),
Ph. N-477* (3 Cr.), Ph. N-478* (3 Cr.), 6 credits from
among Ph. N-435* (3 Cr.), and Ph. N-465* (3 Cr.) and
Ph. N-467* (3 Cr.)

Honours: 2 options (Total 72 Credits each).

Experimental Option - All courses in specialization in experimental physics plus the following: Ph. N-478* (3 Cr.), and 9 credits from Ph. N-345 (6 Cr.), Ph. N-457 (6 Cr.), Ph. N-457 (6 Cr.), Ph. N-435* (3 Cr.), Ph. N-465* (3 Cr.), Ph. N-467* (3 Cr.).

Theoretical Option - All courses in specialization in theoretical physics plus the following: Ph. N-355 (5 Cr.), Ph. N-295 (4 Cr.), and 3 credits from Ph. N-291 (2 Cr.), Ph. N-292 (2 Cr.), Ph. N-392 (1 Cr.), Ph. N-493* (1 Cr.), Ph. N-495* (1 Cr.), Ph. N-435* (3 Cr.), Ph. N-465* (3 Cr.), Ph. N-467* (3 Cr.).

*One term course.

BACHELOR OF SCIENCE

SPECIALIZATION IN PHYSICS-MARKETING

AIM

The purpose of this programme is to prepare students for a career in the marketing and sales division of a technologically-based company.

ROLE OF PHYSICS

The Physics component enables the student to acquire a fundamental understanding of technology.

The Physics Department possesses modern laboratory facilities, in particular self-contained, up-to-date electronics experimental courses which teach students to be skilled users of electronics instrumentation.

ROLE OF MARKETING

The Marketing component teaches managerial and business skills with emphasis on marketing, that is, the flow of goods and services from those who produce them to those who need them.

The Marketing Department consists of faculty members with wide experience in business and universities. This department is part of the Faculty of Commerce and Administration.

ADMISSION REQUIREMENTS

Pre-Science CEGEP diploma or the equivalent. Persons over 21 not meeting the admission qualifications may take the necessary prerequisites in the Mature Student Programme.

APPLICATION

Applications are invited for the session starting in September, 1976. Mature students can start their program in September, January or June.

INFORMATION

For more information telephone the Physics Department at 879-5915.

B.Sc. IN PHYSICS MARKETING

COURSES

PHYSICS

Physics N-241, N-251, N-291, N-292, N-295; N-364*, N-394*.

Twelve credits from Physics N-296, N-336, N-345, N-352*, N-355*, N-392*, N-396, N-397, N-433, N-435*, N-457, N-465*, N-467*, N-477*, N-478*, N-480*, N-493*, N-495*.

MATHEMATICS

Mathematics N-261.

COMMERCE

Quantitative Methods N-243* and N244* or equivalent.

Computer Science N-211*.

Accountancy N-213* and N-218*.

Management N-213* and N-340*.

Economics N-209* and N210* or N-212*.

Marketing N-213*, N-350*, and 15 credits from courses offered by the Department.

NOTE: All laboratory courses in Physics with one credit must be completed in a single term.

In general, the experiments involved in the laboratory courses can be done from week to week at a variable time chosen by the student.

PHYSICS LABORATORY COURSES

Grading

The following information applies generally to all the physics laboratory courses.

A student after studying the instruction sheet for a particular experiment, writes a small computer pre-test based upon the material on the sheet and the related theory. The student then reserves that experiment for the time of his/her choice. Sometime after the experiment is completed (up to the deadline) the student, using the lab report, writes a computer test on the experimental results and the theory of the experiment. After all the experiments are completed the student writes a final test, using the lab reports.

A grade is given for each experiment, these grades count towards the final lab course mark. The final test counts for a small part of the final mark. The individual mark for each experiment is made up of two parts, 6 - 18%, from the pre-test, 82 - 94% from the test on results.

The tests cannot be repeated, but experiments may be repeated before the test is written.

All pre-tests and tests are written in room H834-2.

PHYSICS COURSES

PHYSICS N-204/2, 204/4 (104)
MECHANICS (3 credits)
ELECTRICITY & MAGNETISM

Professors: 204/2, 204/4
Instructors: 204/2, 204/4
52-010-2, 52-010-4

Description: Electricity and Magnetism. Law of Conservation of Energy. Capacitors. Inductors. AC circuits. Wave motion. Sound. Light. Optics. Modern Physics.

Prerequisites: None. Co-requisites: None. This course is a required course for students in the Physics program.

Reference: "Elements of Physics", 5th edition, (Prentice-Hall, 1971). "Physics", 5th edition, (Prentice-Hall, 1971).

Grading: Final exam, maximum of four. Minimum of one. Homework assignments, maximum of one. Laboratory assignments, maximum of one.

Further Special: None. This course is a required course for students in the Physics program.

Prerequisites: CEEB Mathematics 103 or Math N-203. This course is a required course for students in the Physics program.

Further Special: None. This course is a required course for students in the Physics program.

Prerequisites: None. This course is a required course for students in the Physics program.

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PHYSICS N-204/2, 204/4 (104)
MECHANICS (3 credits)

Professors: 204/2

Dr. S. Morris TT 8:45-10:00
Dr. D. Charlton Tues 6:15-8:10

204/4

Dr. S. Morris Tues 8:30-10:25

Description: Kinematics. Newton's Laws of Motion.
Statics, dynamics. Conservation of
momentum and energy. Rotational Motion.
Periodic Motion. Lectures only.

Reference: Shortley & Williams, "Elements of Physics,"
5th edition. (Prentice-Hall, 1971).

Assignments & Grading: Dr. Morris - Homework assignments may be
graded. Minimum of one
final exam, maximum of four.

Dr. Charlton - Homework assignments not
graded. Minimum of one
final, maximum of four.

Prerequisite: CEGEP Mathematics 103 or Math N-203
(Calculus), or equivalent, previously
or concurrently.

Further Special

Comments: Lectures only.
The accompanying laboratory course N-224
should NOT be taken concurrently by
students with no previous physics back-
ground.

NOTE - Students who have credits for
CEGEP Physics 101 or equivalent may not
take this course for credit.

PHYSICS N-205/4 (105)
ELECTRICITY & MAGNETISM (3 credits)

Professor: Dr. D. Charlton MWF 8:45-9:35
Dr. A. Smith Wed. 8:30-10:25

Description: Electrical charge and Coulomb's Law.
Electrical field and potential. Capacity.
Steady state and transient currents.
Electromagnetic induction and alternating
currents.

Reference: G. Shortley & D. Williams,
"Elements of Physics", (Prentice-Hall,
1971).

Assignments & Grading: Dr. D. Charlton Three class examin-
Dr. A. Smith ations and a final.
Problems to be discussed
in class.

Prerequisite: Physics N-204 (104) or the equivalent.

Further Special

Comments: Lectures only.

NOTE:- Students who have credits for
CEGEP Physics 201 or equivalent may
not take this course for credit.

The associated lab course is Ph.
N-225.

PHYSICS N-206/4 (104)
WAVES AND MODERN PHYSICS (3 credits)

Professor: Dr. A.L. Kipling TT 8:45-10:00
Dr. D. Charlton Mon. 6:15-8:10

Description: Simple harmonic motion. Wave propagation. Superposition. Stationary waves. Doppler effect. Interference, Diffraction, Photoelectric effect. Compton effect. Bohr's atom. Radioactivity, fission, fusion.

Reference: Shortley & Williams, "Elements of Physics", 6th ed. (Prentice-Hall, 1971).

Assignments and Grading: Dr. A. Kipling- Homework assignments not graded. Minimum of one final, maximum of four.

Dr. D. Charlton-Three class examinations and a final. Problems to be discussed in class.

Prerequisite: Physics N-204 or equivalent.

Further Special

Comments: Lectures only.

The associated lab course is Ph. N-226.

PHYSICS N-210/3 (010/3, 210/3)
DISCOVERIES IN PHYSICS (6 Credits)

Professor: Dr. A.E. Smith Thu. 8:30-10:25

Description: A non-mathematical course in physics specifically designed for students who have had little or no experience in physics. It traces the fundamental ideas from which modern physics has emerged and attempts to develop insights into the understanding of natural phenomena. The ideas introduced are supplemented with examples from art and our physical environment. In this manner the student learns basic principles from familiar interests and situations.

References: Various paperbacks and library resources are recommended during lectures.

Assignments and Grading: A paper each term (60%)
Assignments (40%)

Prerequisites: None

Further Special

Comments: Lectures only.

PHYSICS N-224 (124)
INTRODUCTORY EXPERIMENTAL MECHANICS (1 Credit)

Professors: Mr. W. Spears, Dr. S. Morris and
Dr. D. Charlton Room H834-2

Description: A laboratory course covering fundamental experiments in classical mechanics. Experiments will include: resolution of forces, centrifugal forces and conservation of energy, pendulums, coefficients of restitution, moment of inertia. (10 experiments).

Assignments and Grading: See page 10

Prerequisites: Physics N-204 previously or currently or permission of the department.

Further Special Comments: Students with no previous background in Physics should not take this course concurrently with Physics N-204. Laboratory only.

PHYSICS N-225
INTRODUCTORY EXPERIMENTAL ELECTRICITY (1 Credit)

Professors: Dr. D. Charlton, Dr. A.E. Smith and
Mr. W. Spears Room H834-2

Description: A laboratory course covering fundamental experiments in electricity. Experiments will include Kirchoff's Law, resistors in series and parallel, oscilloscopes, induction, AC. (10 Experiments).

Assignments and Grading: See page 10

Prerequisites: Physics N-205 previously or currently, or permission of the department.

Further Special Comments: Laboratory only.

PHYSICS N-226 (126)
INTRODUCTORY EXPERIMENTAL WAVES AND MODERN PHYSICS
(1 Credit).

Professor: Mr. W. Spears, Dr. A.L. Kipling and
Dr. D. Charlton Room H834-2

Description: A laboratory course covering the fundamental experiments in waves and modern physics. Experiments include spectrometer measurements, Newton's rings, and measurements involving radioactivity. (10 experiments).

Assignments and Grading: See page 10

Prerequisites: Physics N-206 previously or concurrently or permission of the department.

Further Special Comments: Laboratory only.

PHYSICS N-241/3

This course is equivalent to Ph. 243/2 and
and N-244/4.

PHYSICS N-243/2

CLASSICAL MECHANICS (3 Credits)

Professors: Dr. R.C. Sharma MWF 8:45-9:35
Dr. A.L. Kipling Mon 6:15-8:10

Description: Physical quantities of Mechanics, Laws of Classical Mechanics, Kinematics of a Particle, Dynamics of a Particle in Straightline and General Motion Moving Reference Systems.

Reference: G.R. Fowles, "Analytical Mechanics", 2nd. ed., (Holt, Rinehart and Winston, 1970).

Assignments and Grading:

Dr. Sharma: Grading is based on the final examination and a mid-term test. The mid-term marks are only considered if they go in favour of the candidate.

Dr. Kipling: Problems are assigned weekly. Solutions are posted.

Prerequisites: Physics N-204 or CEGEP Physics 101. Mathematics N-261 previously or concurrently.

Further Special Comments:

Lectures only.
There is an associated lab course Physics N-291.
Students who have credit for Physics N-242 may not take this course for credit.

PHYSICS N-244/4

CLASSICAL MECHANICS OF RIGID BODIES. (3 Credits).

Professors: Dr. R.C. Sharma MWF 8:45-9:35
Dr. A.L. Kipling Mon 6:15-8:10

Description: Dynamics of a System of Particles, Statics of Rigid Bodies in a Plane and in General Motion, Lagrange's Equations.

Reference: G.R. Fowles, "Analytical Mechanics", 2nd. ed., (Holt, Rinehart and Winston, 1970).

Assignments and Grading:

Dr. Sharma: Grading is based on the final examination and a mid-term test. The mid-term marks are only considered if they go in favour of the candidate.

Dr. Kipling: Problems are assigned weekly.
Solutions are posted.

Prerequisites: Physics N-243.

Further Special Comments:

Lectures only.
There is an associated lab course Physics N-291. Students who have credit for Physics N-242 may not take this course for credit.

PHYSICS N-251
ELECTRODYNAMICS I (6 Credits)

Professor: Dr. N. Eddy MWF 10:55-11:45
Dr. B. Frank Wed. 8:30-10:25

Description: Electric forces and electric fields, electric potential, capacitance, dielectric theory and behaviour, direct currents, resistance, thermoelectricity, moving charges and magnetic fields, electromagnetic induction, the magnetic properties of matter, galvanometers, transient currents, alternating current circuits, Maxwell's equations and electromagnetic waves.

References: H.E. Duckworth: Electricity and Magnetism (Holt, Rinehart and Winston, 1960).
Sears, "Electricity and Magnetism", (Addison-Wesley).

Assignments and Grading: Dr. N. Eddy: Mid-term examination.
Christmas examination. Final examination. Class assignments.

Dr. B. Frank: Mid-term examination. Final Examination. Class assignments.

Prerequisites: Physics N-205 or CEGEP Physics 201 or equivalent. Math N-261 previously or concurrently.

Further Special

Comments: Lectures only.

The associated lab course is Ph. N-292.

PHYSICS N-291
EXPERIMENTAL MECHANICS I (2 Credits)

Professors: Mr. W. Spears, Dr. R.C. Sharma and
Dr. A.L. Kipling. Room H834-2

Description: A laboratory course in mechanics. Experiments include the Kater pendulum, forced oscillations, damping and resonance, inelastic and elastic collisions, beam constants. Many difficult principles are easily observed through the use of air tracks. (20 experiments)

Assignments and Grading: See page 10

Prerequisites: Physics N-241 previously or concurrently.

Further Special Comments: Laboratory only.

Assignments and Grading: Same as Physics N-292.

Prerequisites: CEGEP Physics 201 or Physics N-205 or permission of the department.

Further Special Comments: Laboratory only.

PHYSICS N-292
EXPERIMENTAL ELECTRODYNAMICS (2 Credits)

Professor: Mr. W. Spears, Dr. N. Eddy and Dr.
B. Frank Room H834-2

Description: A lab course in electrodynamics. Experiments include electrostatic focusing, motion in crossed magnetic and electric fields, resonance, Fourier analysis, feedback, transistors, oscillators. This lab closely follows that of its equivalent at Berkeley University. (20 experiments).

Assignments and Grading: See page 10

Prerequisites: Physics N-251 previously or concurrently.

Further Special Comments: Laboratory only.

Prerequisites: Physics N-205 or CEGEP Physics 201 or equivalent. Math N-251 previously or concurrently.

Further Special Comments: Lectures only.

The associated lab course is Ph. N-292.

PHYSICS N-295
FUNDAMENTAL ELECTRONICS (4 Credits)

Professor: Mr. W. Spears Room H834-2

Description: A practical laboratory course in electronics. Descriptive experiments to review: series and parallel circuits, meters, ohmmeter, VOM and TVM circuit loading, reference points in measurements, current measurement in circuits, capacitors and RC time constants, transformers, AC power transfer, resonance, the oscilloscope. Detailed experiments are performed on: rectification, filters, voltage multipliers and regulators, zener diodes, transistor characteristics, biasing, the effect of temperature on transistors and temperature stabilization, amplification, feedback, input and output impedances of transistor circuits, Darlington amplifiers, multistage amplifiers; series and shunt DC regulator, field effect transistors, sine wave and LC oscillators; colpitts and phase shift oscillators, operational amplifiers, application and characteristics, diode clippers, multivibrators, logic gates, comparison of vacuum tubes to transistors.

Assignments and Grading: Same as PHYSICS N-397.

Prerequisites: CEGEP Physics 201 or Physics N-205 or permission of the department.

Further Special Comments: Laboratory only.

PHYSICS N296

COMMUNICATION MEDIA ELECTRONICS (5 Credits)

Professor: Mr. W. Spears

Room H834-2

Description: Distortion, Noise, i.f. trans-formers, converters, power supplies, superheterodyne circuits, video amplifiers and detectors, VHF and UHF tuning, automatic gain control, FM and FM detectors, synchronization circuits, sweep circuits, automatic frequency and phase control, color demodulation, burst gate amplifiers, chromabandpass amplifiers, static convergence, dynamic convergence, high voltage generators. Techniques of troubleshooting electronic circuits.

Assignments andGrading: Same as PHYSICS N-397Prerequisites: Physics N-295 or equivalent.Further SpecialComments: Laboratory only.

PHYSICS N-336

METHODS OF THEORETICAL PHYSICS (6 Credits)

Professor: Dr. S. Morris Tue. 6:15-8:10

Description: Sturm-Liouville Theory: stretched string, Fourier series and applications, Fourier integrals, Vibrating membrane, operators, method of eigenfunction expansions, cylindrical functions, spherical harmonics, perturbation theory for S.L. problem. Group theory: symmetry considerations, definitions. theory of matrix representations, applications. Tensor calculus; tensor algebra, line element, covariant differentiation.

References:

R.V. Churchill, "Fourier Series and Boundary Value Problems", 2nd. ed., (McGraw Hill, 1963).

I. Schensted, "Applications of Group Theory to Quantum Mechanics", (Neo Press, 1965).

D.F. Lawden, "An Introduction to Tensor Calculus and Relativity", (Methum, 1962).

Assignments and Grading:

A series of assignments and tests are marked during the year. The results count towards 50% or 100% of the final mark, at the student's option. If the final examination is written it must count towards 50% of the grade.

Prerequisites: Mathematics N-261 Physics N-204 or
CEGEP Physics 101 or equivalent.

Further Special

Comments: Lectures only.

PHYSICS N-345/3

ADVANCED CLASSICAL MECHANICS & RELATIVITY (6 Credits)

Professor: Dr. B. Frank TT 10:15-11:30

Description: Newtonian mechanics, oscillations, Variational principles and Lagrange's equations, kinematics of rigid body motion, Hamilton's equations of motion, Canonical transformation, Hamilton-Jacobi theory, small oscillation, special relativity.

References: Jerry B. Marion, "Classical Dynamics of Particles & Systems", (Academic Press)

H. Goldstein, "Classical Mechanics", (Addison-Wesley)

Assignments

and Grades: Periodic assignments to be handed in.
Grading to be determined.

Further Special

Comments: Lectures only.

PHYSICS N-352/4
OPTICS I (3 Credits)

Professor: Dr. S.K. Misra Tue. 8:30-10:25

Description: Plane surfaces, spherical surfaces, optical instruments. Wave optics: review of simple harmonic motion, wave equation, superposition of waves, electromagnetic waves, scattering, polarization, interference-coherent sources, interference-uniform extended sources, Fresnel diffraction, waves in a dispersive medium, lasers.

Reference: "Optics" by Hecht-Zajac

Assignments and Grading: The problems will be assigned for homework and discussed in the class. The grading will be based on 25% problem solving in class and 75% final examination at the end of the term.

Prerequisites: Math N-261 and Physics N-205 or CEGEP Physics 201 or equivalent.

Further Special

Comments: Lectures only.

The associated lab course is Ph. N-392.

PHYSICS N-355/3
ELECTRONICS I (5 Credits)

Professor: Dr. A.L. Kipling TT 1:15-2:30

Description: Introductory concepts, AC circuit, electrical measuring instruments. (semi-conductor physics, semi-conductor devices, input transducers and output, transducers), transistor theory, modern signal processing techniques for optimal signal to noise ratios, amplifiers, oscillators, pulse and switching circuits, additional electronic devices.

Reference: A.J. Diefenderfer, "Principles of Electronic Instrumentation", (Saunders 1972).

Assignments and Grading: Problems will be assigned with solutions either done in class or posted. The final grade will be determined from the December and April exam.

Prerequisite: CEGEP Physics 201 or Physics N-205 or equivalent, Physics N-295 previously or concurrently.

Further Special

Comments: Lectures only. The associated lab course is Physics N-295. The first part of the course, semi-conductor physics, is based on a series of five 16mm sound-colour films by the Philips Company entitled "Semiconductor Physics".

PHYSICS N-364/2
ATOMIC PHYSICS I (3 Credits)

Professor: Dr. R.C. Sharma Tue. 8:30-10:25

Description: Kinetic theory, origin of quantum theory, electrons and ions, electromagnetic radiation, the Rutherford atom, the Bohr atom, quantum mechanics, atomic and molecular spectroscopy and X-rays.

References: C.H. Blanchard, C.R. Burnett, R.G. Stoner, R.L. Weber, "Introduction to Modern Physics", (Prentice Hall, 1969).

R.T. Weidner, R.L. Sells, "Elementary Modern Physics". (Allyn & Bacon, 1968).

Assignments and Grading: Weekly assignments, solutions posted, at least two examinations.

Prerequisite: CEGEP Physics (Physics N-206 and Math N-205)

Further Special Comments: Lectures only.

Comments: The associated lab course is Ph. N-394.

PHYSICS N-392
EXPERIMENTAL OPTICS (1 Credit)

Professor: Mr. W. Spears and Dr. S.K. Misra
Room H834-2

Description: An experimental course in Optics. Experiments include diffraction, optical instruments, resonance and various experiments using lasers, Optical principles through the Use of Microwaves.
(10 experiments)

Assignments and Grading: See page 10

Prerequisites: Physics N-352 previously or concurrently,

Further Special Comments: Laboratory only.

PHYSICS N-394
EXPERIMENTAL ATOMIC PHYSICS I (1 Credit)

Professors: Mr. W. Spears and Dr. R.C. Sharma
Room H834-2

Description: An experimental course in atomic physics. Experiments include the Frank-Hertz expt., the Zeeman effect, Mass spectrometer and some X-ray work. (10 experiments).

Assignments and Grading: See page 10

Prerequisites: Physics N-364 previously or currently, Physics N-226 or equivalent.

Further Special Comments: Laboratory only.

PHYSICS N-396
COMPUTER ELECTRONICS (5 Credits)

Professors: Mr. W. Spears Room H834-2

Description: Digital electronic circuits, logic functions and their applications to small digital computers. Study and troubleshooting of integrated circuit logic gates, J-K flip flops, analogue to digital and digital to analogue converters, frequency divider circuits, digital multiplexers and demultiplexers, pulse distributors. Study and implementation of basic logic functions and Boolean expressions to program a small digital computer.

Assignments and Grading: Same as PHYSICS N-397
There is no pre-test in this course.

Prerequisites: Physics N-295 or equivalent.

Further Special Comments: Laboratory only.

PHYSICS N-397
EXPERIMENTAL MEDICAL ELECTRONICS (5 Credits)

Professor: Dr. A.L. Kipling Room H834-2

Description: A laboratory course on the maintenance and use of medical instruments including ECG monitor, electrocardiograph, cardiometer, blood pressure recorder, respiration rate recorder and clinical thermometer. The component parts of the instruments are studied first and then the instruments are constructed and operated.

Assignments and Grading: There are no pretests in this course. The students write a computer test based on their experimental results. A certain number of theory texts will be assigned by the instructor and the student will be tested on these. The final grade will be computed from the results of the tests on the theory texts and experimental results.

Prerequisites: Physics N-295 or equivalent.

Further Special Comments: Laboratory only.

PHYSICS N-433/2
THERMODYNAMICS I (3 Credits)

Professor: Dr. S.K. Misra TT 11:45-1:00

Description: Temperature, simple thermodynamic systems, work, heat and first law, ideal gases, kinetic theory, heat engines, reversible and irreversible processes, entropy, thermodynamic potentials.

Reference: Zemansky, "Thermodynamics" (McGraw Hill, 1968).

Assignments and Grading: There will be weekly assignments of problems. The students will be asked to return the assigned homework, as well as to come to the board to solve problems. The grading will be based on 25% home assignments and 75% mid-term and final examinations.

Prerequisites: Math N-261, Physics N-241 or equivalent.

Further Special Comments: Lectures only.

The associated lab course is Ph. N-493.

PHYSICS N-435/4

STATISTICAL PHYSICS (3 Credits)

Professor: Dr. S.K. Misra TT 11:45-1:00

Description: Basic probability concepts, statistical description of systems of particles, thermal interaction, microscopic theory and macroscopic measurements, Canonical distribution in the classical approximation, general thermodynamic interaction, elementary kinetic theory of transport processes.

Reference: F. Reif, "Statistical Physics", (McGraw-Hill, 1968).

Assignments and Grading: There will be weekly assignments of problems. The students will be asked to return the assigned homework, as well as come to the board once in a while to solve problems. The grading will be on 25% home assignments and 75% mid-term and final exams.

Prerequisite: Physics N-433

Further Special Comments: Lectures only.

PHYSICS N-457/3

ADVANCED ELECTRODYNAMICS (6 Credits)

Professor: Dr. S.N. Bagchi Thu. 8:30-10:25

Description: Fundamentals of electromagnetics, multipole fields, the equation of Laplace and Poisson, the electromagnetic field equations, electromagnetic waves, reflection and refraction, the Lienard-Weichert potentials and radiation, radiating systems, classical electron theory, relativistic electrodynamics.

References: Lorrain and Corson, "Electromagnetic Fields and Waves", (Freeman).

Good and Nelson, "Classical Theory of Electric and Magnetic Fields", (Academic Press)

Assignments and Grading: TBA

Prerequisites: Physics N-251

Further Special Comments: Lectures only.

PHYSICS N-465/4
NUCLEAR PHYSICS I (3 Credits)

Professor: Dr. N. Eddy Thu. 6:15-8:10

Description: Discussion of nuclear properties, deuteron scattering, nuclear models, nuclear disintegrations, nuclear reactions, elementary particles and cosmic rays.

Reference: C.H. Blanchard, C.R. Burnett, R.G. Stoner, R.L. Weber, "Introduction to Modern Physics", 2nd. ed., (Prentice Hall, 1969)

Assignments and Grading:

Mid-term examination. Christmas examination. Final examination. Class assignments.

Prerequisites: Physics N-364 or equivalent.

Further Special Comments:

Lectures only.

The associated lab course is Ph. N-495.

PHYSICS N-467/2
SOLID STATE PHYSICS (3 credits)

Professor: Dr. S. Dubas Thu. 6:15-8:10

Description: Crystal structure, crystal binding, phonons and lattice vibrations, free electron fermi gas, energy bands, semiconductor crystals, superconductivity, dielectric properties, survey of magnetic properties, magnetic resonance, optical phenomena in insulators.

Reference: C. Kittel, "Introduction to Solid State Physics", (Wiley, 1966).

Assignments and Grading:

TBA

Prerequisite: Physics N-364 or equivalent, or Physics N-477.

Further Special Comments:

Lectures only.

PHYSICS N-477/2
QUANTUM MECHANICS I (3 Credits)

Professor: Dr. R.C. Sharma Mon. 6:15-8:10
Dr. R.L. Kovacs TT 1:15-2:30

Description: State functions and their interpretation, linear momentum, motion of a free particle, Schrodinger's Equation, states of a particle in one dimension.

Reference: David S. Saxon, "Elementary Quantum Mechanics", (Holden Day).
D.A. Park, "Introduction to the Quantum Theory", (McGraw-Hill).

Assignments and Grading: Dr. R.C. Sharma: Problems are assigned for homework. Grading is based on the final examinations and a mid-term test. The mid-term test marks are only counted if they go in favor of the student.

Dr. R.L. Kovacs: TBA

Prerequisites: Mathematics N-270 or Physics N-241, N-336 previously or concurrently.

Further Special Comments: Lectures only.

PHYSICS N-478/4
QUANTUM MECHANICS II (3 Credits)

Professor: Dr. R.C. Sharma Mon. 6:15-8:10
Dr. R.L. Kovacs TT 1:15-2:30

Description: States of a particle in one dimension, approximation methods, systems of particles in one dimension, motion in three dimensions, angular momentum and spin.

Reference: David S. Saxon. "Elementary Quantum Mechanics", (Holden Day)
D.A. Park, "Introduction to the Quantum Theory", (McGraw-Hill)

Assignments and Grading: Dr. R.C. Sharma: Problems are assigned for homework. Grading is based on the final examinations and a mid-term test. The mid-term test marks are only counted if they go in favour of the student.

Dr. R.L. Kovacs: TBA

Prerequisites: Physics N-477 and N-241 or equivalent.

Further Special Comments: Lectures only.

PHYSICS N-480/2
BIOPHYSICS I (4 Credits)

Professor: Dr. A.E. Smith MWF 10:55-11:45 (Lecture)
Fri 14:00-18:00 (Lab)

Description: The course is introduced by briefly describing the state of knowledge on how life systems originated. The role of light, sound, electricity and magnetism in various physiological processes is studied. Practical applications.

Assignments and Grading: Term papers and class discussions, take-home exam.

Prerequisite: University II standing in biology, physics or biochemistry or permission of the Department.

Further Special

Comments: This course will be of interest to students who are interested in any aspect of life science because it emphasizes the energetics of the life process on various levels of biological organization. People who are interested in medical work would be interested in the many applications of physics to medicine and such instruments as the electrocardiogram, audiometer, electroencephalogram, will be discussed.

PHYSICS N-493
EXPERIMENTAL THERMODYNAMICS I (1 Credit)

Professors: Mr. W. Spears and Dr. S.K. Misra
Room H834-2

Description: A lab course in thermodynamics. Experiments include Clement and Desormes experiment, vapourisation, specific heats, liquid nitrogen boiling, conductivity of good and poor conductors, radiation, expansion and contraction of liquids and gases. (10 experiments).

Assignments and Grading: See page 10

Prerequisites: Physics N-433 previously or concurrently.

Further Special

Comments: Laboratory only.

The following courses are also available at Loyola Campus.

Students interested in registering in these courses should pre-register with the physics department, S.G.W. Campus.

Ph N-465 (Loyola P503A MWF 10:00 Fall term)

Ph N-467 (Loyola P505B MWF 10:00 Spring Term)

Ph N-457 (Loyola P512A)
(and P512B) MWF 11:00)

Ph N-336 (Loyola P323A)
(and P420B) MWF 12:00)

In principle, it is possible for any student registered at S.G.W. Campus to take an equivalent course at Loyola Campus. Please contact the S.G.W. physics department for pre-registration re this.